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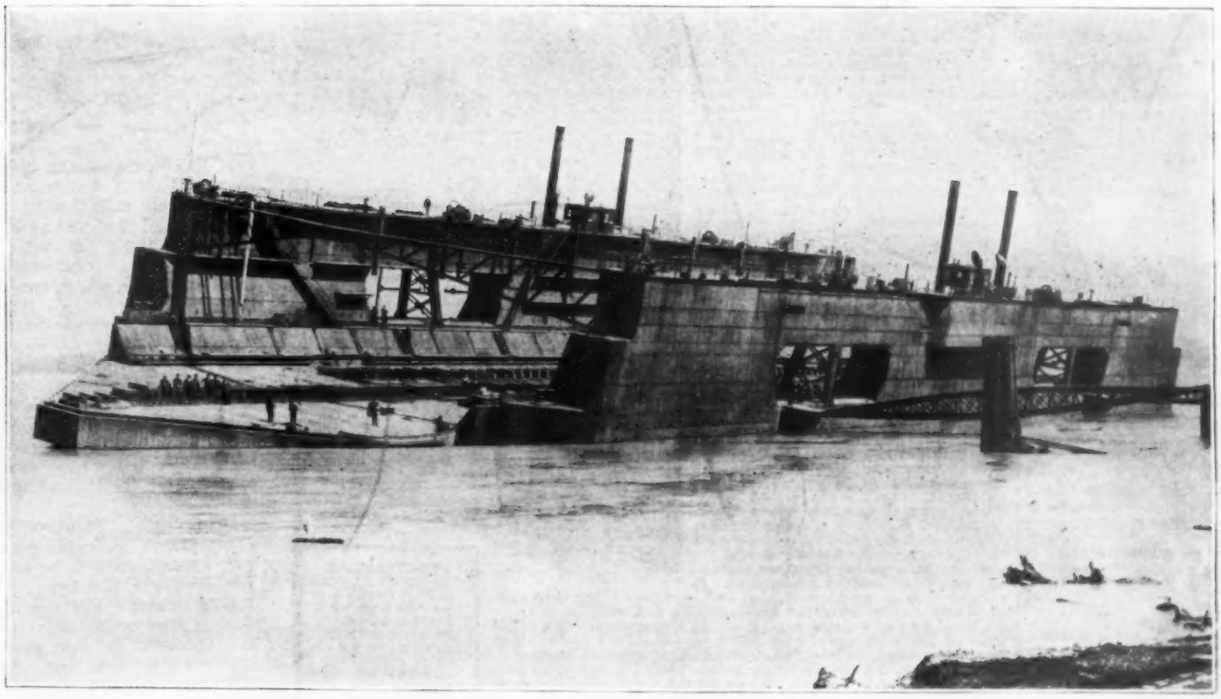
Vol. 3. No. 26. CHICAGO, JUNE 27, 1903. PRICE 5 CENTS.

The Greatest Floating Dry Dock Ever Built



Huge Construction at New Orleans That Can Cradle the Largest Warship in the American Navy--See Page 405

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SMITHSONIAN DEPOSIT

Energy From Radium Found by Yale Scientists

Suggestion of a Force More Powerful Than Any Yet Known to Man

Yale scientists have found the first signs of radio activity ever discovered in America.

For two months Dr. Lynde Wheeler and Dr. H. A. Bumstead of the Sheffield Scientific School have been conducting original investigations along the lines suggested by Professor J. J. Thomson of England, the eminent physicist, and they have found what appears like one discovery the great Cambridge scientist failed to make in his own laboratory.

They are confident that they have shown that the presence of radio activity can be demonstrated in surface water, at least in some parts of America.

Repeated experiments performed by Drs. Wheeler and Bumstead at Yale with water taken from the city supply at Lake Whitney show the radio-activity. Professor Thomson tried repeatedly to secure similar results from the water of England on different parts of the island without success.

He found it in water taken from unusually deep wells and through chalk. When he came to Yale to deliver the Silliman lectures recently he was enthusiastic over his experiments, which indicate a force so powerful that, as Professor Thomson expressed it, the coal mines of the world may not be needed for either heat or energy if the new element, radium, can be utilized, as seems a possibility, if theories now being developed are perfected.

Professor Thomson went to New Milford, Conn., with the Yale scientists, and from water taken from a well 1,500 feet deep, radio-activity was found. The Yale scientists have just forwarded their discovery to Professor Thomson and he is delighted.

Dr. Wheeler said:

"In finding the radio-activity the water was first boiled, the steam that came off was condensed and the gas collected in a holder, and by means of an electroscope the radio-activity was discerned from reservoir water from Lake Whitney. Two lots were tried, but as both were taken after a rain, and some of the salt may have been conducted, we shall make another attempt at final verification, but we believe that there is radio-activity in surface water in this vicinity."

Professor Thomson's experiments in radio-activity were started by his bubbling air through ordinary water. He found that it was radio-activity. He thought at first that his results were due to the process, but later that the energy lay in the water. All the live interest in physics to-day lies in the domain of investigation into radium and the other new elements. The question is:

"Where is the energy to keep the activity up?"

At Yale the experiments will be continued all summer. Additional apparatus is being constructed at the Sheffield Scientific School.

On the theory that at a great depth a corresponding increase in radio-activity can be found, it is thought at the bottom of mines the force can be found. One great drawback is that the electroscopes will not work successfully in them, owing to the dampness. An attempt is being made to experiment in dry caves.

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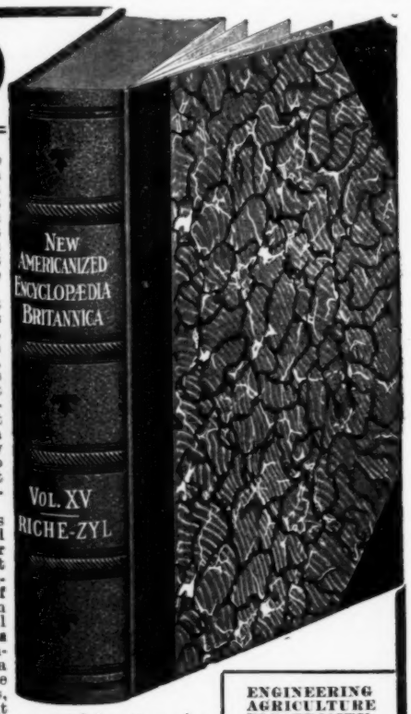

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Giant of The Forests Cut Down For a World's Fair

This Generation of Oregonians Gives Away Oregon's Most Precious Natural Endowment

The largest tree in Oregon was felled the other day that it might be hauled to the St. Louis world's fair and there exhibited as a curiosity—a lifeless reminder of the noble creation it was in its natural state. It was the Aberdeen spruce. Standing nearly 300 feet high, 40 feet around and 118 feet from the ground to the first limb, this lord of Oregon's forests towered like a giant above all the growth around. For 440 years it had stood unmolested by savage, beast or insect, defying the elements and becoming grander with its age. But what the savage and the beast and the insect seemed to hold as sacred the Spirit of Civilization smiled to destroy.

The event of its fall was made an occasion of great importance to the people of Aberdeen and Oregon. "Men will call us great because we have a great tree here," was the substance of the speeches, "and so we will take the tree to the fair, that all may know about us." Prominent citizens came from all parts of Oregon to witness the sacrifice. Women smiled in delight and men spoke wisely, contentedly, when the woodman's saw and ax began their assault on the imperial spruce. Even while the great gash was being dug in its side, long the tree stood firm and resolute. The voice of its leaves spoke in the same noble, defiant tone the birds and the squirrels had heard for more than four centuries. But the woodmen sweated and chopped and sawed while the smiling women and the wise men of Oregon looked on complacently. In time the topmost limb of the colossus was seen to waver in its heavenward height, it turned and swayed out into a neighboring realm of space it had never before approached in the hundreds of years of its anchoretic existence. Then with a lunge the massive top left its serial home and the air rushed in to claim a space it had been denied for centuries; the birds set up a cry of woe and the trees of the forest groaned in humility while their great chieftain was falling. A crash like the peals of thunder when the lightning's strike is near; a roar as loud as a herd of lions could sound: a mighty deafening din louder than the firing of a battery of artillery echoed and re-echoed from hill to hill through the forests, growing lower with their recurrence and gradually ceasing as if it were the spirit groans of the dying tree. A broad path of blue sky, revealed through the gaping wound in the embowering tree tops, marked the course of its fall. And the splendid organism it had taken nature ages to rear for Oregon was destroyed by civilized Oregonians in part of a day. Surely Oregon has been generous in the contribution of curiosities for the entertainment of visitors at the fair. Surely Oregon's price of advertisement ought to bring returns.

Oregonians Gloating Over Their Work of Devastation

The World's Greatest Floating Dry Dock is at New Orleans

In Construction and Operation It Has No Equal In Any Land--Can Be Sunk Sufficiently to Acommodate Any Battleship in the Navy

By Rear Admiral John D. Ford, U. S. Navy, Contributor to the Journal of the Society of Naval Engineers

The New Orleans floating drydock has the greatest lifting capacity of any dock of its type. In workmanship, equipment and machinery, as well as in facility of operation, it is considered superior to any floating dock yet built.

Since the docking of the Illinois a natural scour has set in under the dock, and the continuous flow of water under the structure has carried away all of the soft material, leaving a splendid foundation of clay at even a greater depth than is necessary for the extreme sinking of the dock even at the lowest stages of the tide. Several months' observation indicate that the scouring under the dock is permanent, and that no future trouble may be anticipated from lack of required depth for sinking the dock sufficient to enter any battleship that we possess.

The whole dock is operated from a central station house on each side wall. In these stations levers are placed by means of which the valves are operated. Signals are arranged by means of which the position of every valve can be known at a glance. Each station is in direct communication with those in charge of the engine and fire rooms by means of speaking tubes, and thus the dockmaster has complete control of every pump and valve. The docking of the ship can thus be manipulated without the dockmaster leaving his central station. The dock is moored by four stud-link chain cables, to each of which are attached mushroom anchors. These anchors are handled by capstans connected to winches which are installed on the upper deck of the side walls. The dock is also connected to shore steel columns by two steel lattice booms, which are free to move in all directions to accommodate for the rise and fall in the river, which is subject to great fluctuations. These connections also permit the dock to be swung in toward the shore so that the structure need not be exposed to the strongest current of the river.

The side walls are provided with flying gangways, which are placed at the bow end of the dock, hinged so as to swing together. The side walls are fitted with platform and protecting hand rails to provide a means of passing from one section to the other. Convenient ladders and stairways are placed on the inside of the side walls to reach the upper decks from the pontoon deck. Light swinging hand cranes are provided on each gangway deck for handling material. There are also provided fair-leads and other appliances for handling the necessary lines required for docking the vessels.

The original cost of the New Orleans dock was $810,000, but since it was built many costly and important improvements have been made, adding greatly to its efficiency.

President Chas. H. Cramp, of the Cramp Ship and Engine Building Company, attributes the enormous growth of English shipping interests to subsidies offered by the English government, and he urges the passage of an American ship subsidy bill.

SHAMROCK III IN DISASTROUS WRECK.

Steward Drowned, Several Injured and Sir Thomas Lipton Narrowly Escapes Death

Shamrock III, Sir Thomas Lipton's latest challenger that is to try and lift the America cup, has arrived at New York. During a sudden squall that came up while Shamrock III was engaged in trial races with a former challenger in Weymouth Bay recently, the new yacht narrowly escaped total

Shamrock III During the Squall

destruction; the steward was drowned, several of the crew were injured and Sir Thomas Lipton narrowly escaped a watery grave. The challenger and Shamrock I had come out of the roadstead for some trial spins and were sailing with jib foresail, gaff topsail and mainsail, there being a strong breeze from the north. Suddenly the squall burst on them. Shamrock III was about to tack when her mast was broken eight feet above the deck and with it the whole of her canvas was carried away.

"NOTES ON TRACK" A GREAT BOOK.

Well Known Editor Gives to the Railway World a Most Comprehensive Treatise on Road Construction and Operation

Just at the time when the modern railway man finds it impossible to keep pace with the rapid progress of the present day without scientific study, W. M. Camp, editor of the Railway Review, Manhattan building, Chicago, has come to his rescue with probably the most thorough and comprehensive work on railroads ever published. The railroad man sees that the old conditions when his practical daily experience gave him all the knowledge he needed in his work, have passed, and now he must fall behind in the race unless he has recourse to good literature. The work by Mr. Camp fills his wants, exactly. It is entitled "Notes on Track." Containing 1,214 pages and 620 illustrations, the book will be found of interest to every person who has anything to do with the building or operation of a railroad. Instructive alike to employer and employed it treats in a most intelligent manner of the railroad conditions as they are to-day and explains deftly all the modern time and labor saving methods. Railway engineers, superintendents, roadmasters, track foremen, bridge men, signal men, railway contractors, supply men and engineering students are sure to find in the handsome volume information that will add greatly to their knowledge and skill. The work has the great advantage of coming from an author who has spent nearly all his life in studying and writing about railroads. A leading member of the American Society of Engineers and editor of one of America's greatest railway journals, it would be hard to find a person more capable of writing such a book than Mr. Camp.

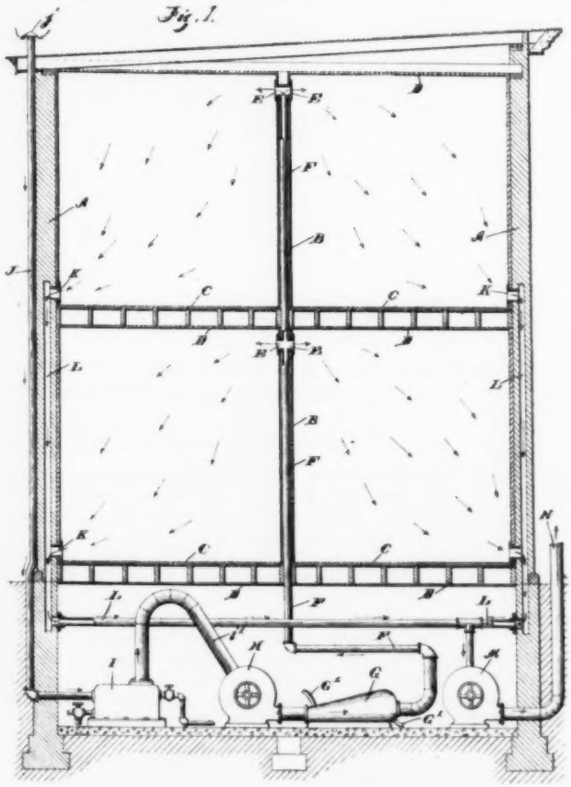
PURE AIR WITH WINDOWS CLOSED.

New and Novel Ventilating System That May Revolutionize Old Methods

In future the raising of windows and opening of transoms to let in air of varying temperature and uncertain purity will be a thing of the past. A Chicagoan—Jesse E. Lawrence, 313 Medinah Temple—has invented a cooling and ventilating system by which air, absolutely pure and as cool as desired, is circulated through the room by merely opening a register or ventilator located in the interior partition near the ceiling. Thus an interior room of a hotel without windows may have air as pure and cool as the room with the most favored exposures. In fact the air will be much purer than that admitted by windows, for before it reaches the room it will be purified—ridded of all dust, smoke and germs and moistened to the proper degree of humidity.

The operation of the system is clearly shown in the accompanying illustration, representing an interior section of a building. By means of a fan or blower, H, in the basement, the air is drawn in through the pipe J from above the building at j, where there is a cap for excluding the weather. It is passed on down through a purifier I and cooler G into the pipe or duct F and up to and out of the ventilators E. The foul air is drawn off through the register K, located near the bottom of the wall through the ducts or conduit pipes, leading to the exhaust fan M, and out the discharge pipe N.

The cooling plant is operated on the same principle as a refrigerator plant, a coil being cooled by means of a freezing mixture, such as brine or ammonia. In the purifier there is a spraying coil, having a great number of minute perforations, through which water is discharged in fine streams filling the tank through which the current of air passes with a spray,



Section of Building Showing New Ventilating System.

which washes out the soot and dust. The plant may be installed in a building of any size, and the cost is insignificant after the installation.

A fireman in an electric power house at Windsor, Can., met a horrible death. He dropped down on a belt to take a nap. Shortly after some derangement of the machinery caused the belt to be started suddenly, and the man was dragged, feet first, between the belt and the pulley.

Architecture of Ancient Manila

Bridges That Would Shame The American Builder--No Bunglesome Unsightly Superstructure

The old styles of Spanish architecture to be seen on every hand in Manila are a source of delight to the tourist of artistic taste. Built hundreds of years ago these structures yet stand intact and strong—a monument to the superior skill of the ancient day architect and builder. There is no building in America but that will have crumbled to dust long before it has stood half as long as the church of San Sebastian, Manila. This is a splendid ancient edifice that yet towers high above the surrounding buildings and serves as a conspicuous ornament to the city. Its bells clang every fifteen minutes throughout the day the different rings serving to acquaint a large portion of the population with the time.

Bridge of Spain, Manila

The style of architecture employed in building the bridges of Manila is another source of beauty to the city. The ugly, bunglesome superstructures that so despoil the appearance of American bridges were not tolerated by the early Spanish architect. As will be seen from the accompanying illustration, "Bridge of Spain," the spans are supported from below, the top being level with the street, giving to the whole structure a picturesque appearance unknown to most of our modern bridges. The ancient steps leading down to the water in the foreground help to show the magnificence of the early day Spanish architecture.

Residence Street in Manila

None the less artistic are the representative native homes of Manila and other cities of the Philippines. All the more pretentious are built with an interior court, the central adornment of which is a great fountain, playing under the palms. Here the senors, senoras and senoritas take their mid-day siesta and lounge about during the leisure hours. The homes are often almost completely embowered under stately palms, which shelter the porches from the torrid rays of the tropical sun. The one detrimental feature to the architecture is the narrowness of the streets.

The average size of redwood saw logs is two to eight feet in diameter, but there is one in Santa Cruz county, California, which has a circumference of fifty-eight feet.

FROZEN FISH FOR THE TROPICS.

The experiment of shipping a 16-lb. shad in a 300-lb cake of ice from Philadelhia to Port Antonio, Jamaica, will be watched with interest. Geo. H. McKay, superintendent of the Terminal Market, and Prof. G. Harold Powell, assistant pomologist of the Department of Agriculture at Washington, D. C., are conducting a series of experiments in preparing food products by cold storage for export. The ice and fish will be wrapped in a two-inch covering of felt.

METALS $2,000,000 A POUND.

William L. J. Hammer of New York is said to possess the only specimen extant of the newly discovered remarkable metal, polonium. He gave an exhibition of polonium and actinum at Philadelphia recently and explained that they were valued at $2,000,000 a pound.

Church of San Sebastian, Manila

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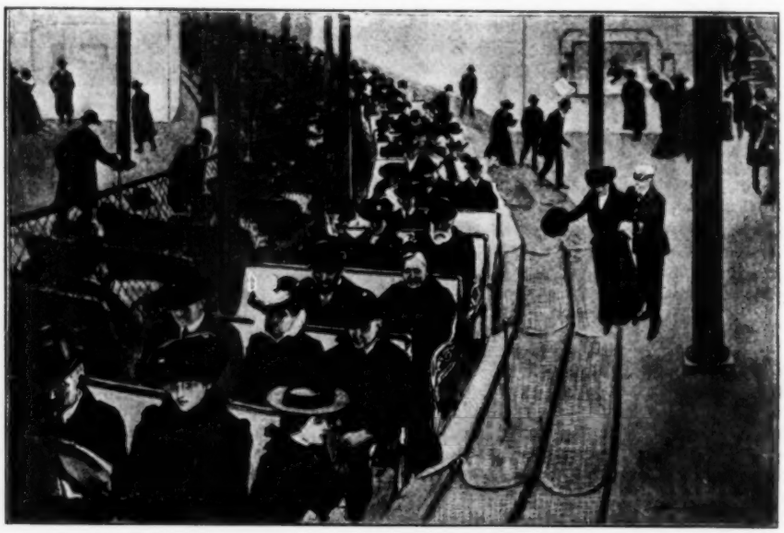
At a recent test in Germany of the Pollak-Virag system of telegraphy a speed of 50,000 words an hour was attained. In transmitting, this system, like other fast systems, uses a strip of paper previously punched with holes representing dots and dashes. The most novel feature of the system is the method of receiving. The incoming electric impulses cause a thin strip of metal resembling a telephone diaphragm, to vibrate, and thus move a tiny mirror attached thereto. A slender beam of light from an incandescent light falls upon the mirror, and is reflected thence to a strip of photographically sensitive paper, which is steadily unrolled by clockwork when messages come. Chemicals for "development" being applied, the paper exhibits a continuous dark line, with upward projections for dashes and downward ones for dots. The message must then be deciphered and the translation must be written out.

The Street Car of The Future

Continuous Train of Seats on Moving Sidewalk to Solve Transportation Problem

An endless street car, or a moving sidewalk with seats on it, is proposed as the solution of the transportation problem in the congested districts in New York and Chicago. Chicago has decided to let New York try the venture first and if it works successfully there to adopt it in the Western metropolis. In New York it is proposed to use the system in connecting the Manhattan terminals of three great bridges over the East river with one another, and with the subway and elevated railroads as well as with the leading surface lines running north and south. The method, it is said, will relieve the congestion of the Brooklyn bridge and make the Williamsburg bridge now approaching completion and the Manhattan bridge, which is well under way, do their share of the work. The moving seats are simply an improvement on the moving sidewalks and continuous trains, which were in operation at the Chicago and Paris expositions, and which carried millions of people along at a good rate of speed and in absolute comfort without accident. The method of operating these platforms is well known. There are two so-called "stepping" platforms running alongside the train platform.



Endless Street Car for New York and Chicago

The passenger steps on one platform moving at the rate of three miles an hour. He then steps on one moving at six miles an hour. From that he steps on the continuous car moving at nine miles an hour and takes his seat. The seats will hold three persons and will be three feet apart. To alight from the "continuous car," the passenger simply steps from one platform to another of diminishing speed, and finally gets off at his station.

PREVENTS SCALE FORMATION.

A liquid which converts the solids contained in water into soft sludge that makes fine powder, when dried, is being used with spendid success by stationary engineers of Chicago's big department stores, and several of the city's larger plants in preventing the formation of scale in steam boilers. The liquid,

Scale Before Using Superior Chemical Compound

which is of clear amber color, is the discovery of Ulysses S. Jenkins, the well-known mechanical chemist.

Mr. Jenkins says: "The preparation acts by destroying the affinity of one ingredient contained in water for another, which is the basis of preventing incrustation; and will also prevent foaming, pitting and corrosion. It is a chemical preparation which possesses absolutely no injurious ingredients. It permits the use of exhaust condensed water with perfect safety. It keeps the iron and sheets free from any oily or greasy

Powder After Using Superior Chemical Compound

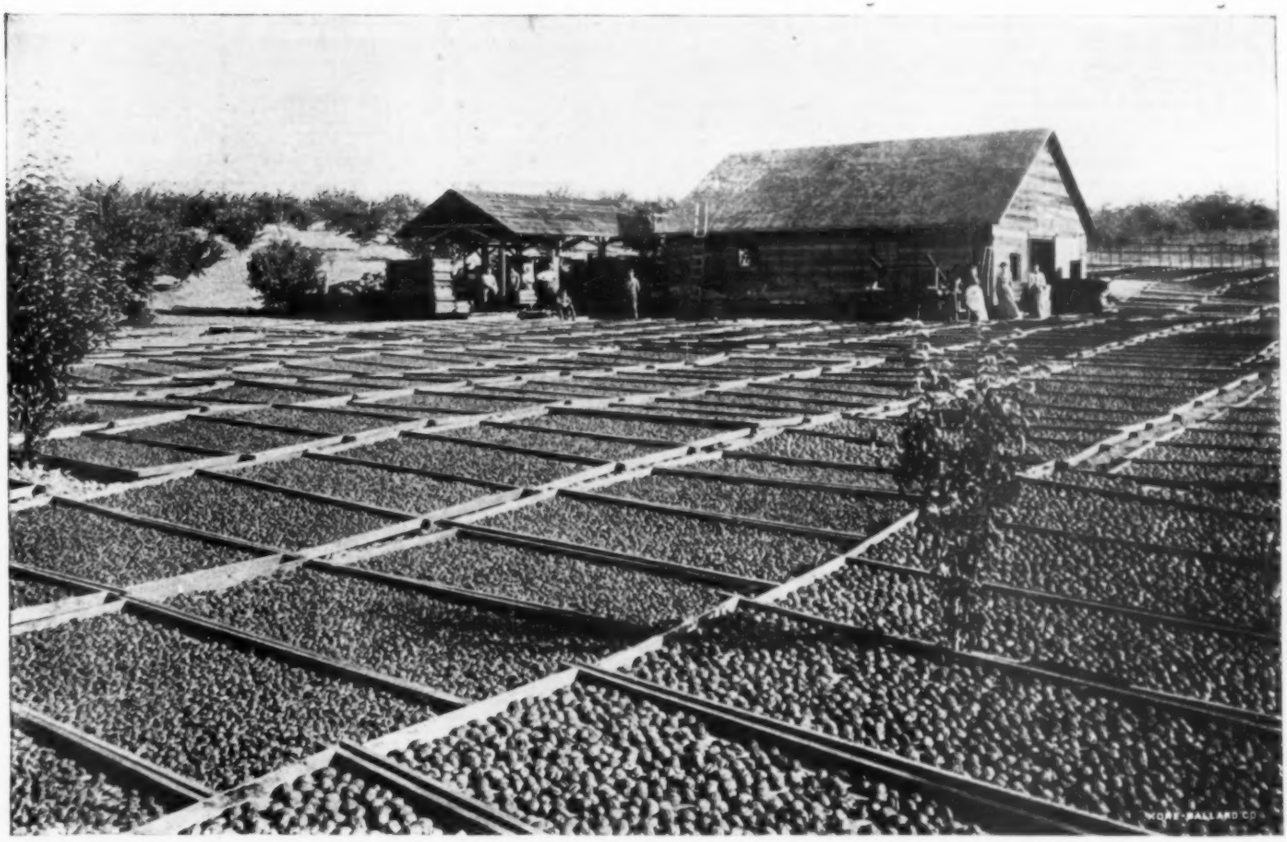
coating, allowing the water to come in better contact with the iron and generate steam more rapidly.

A crucible cast steel, capable of being readily welded and forged or hardened, is produced, according to a Galician process, by melting a mixture of soft iron and an alloy prepared by melting together iron, cobalt, charcoal, and oxide of titanium, or a salt or oxide of any metal of the chromium group, such as chromium, oxide, molybdic acid, tungstic acid, or uranium oxide.

A COUNTRY FULL OF PRUNES.

Pacific Coast States Produce the Supply for Nearly All America —The Work of Drying

Raising and drying prunes is an important industry on the Pacific Coast. On the plantations in the vicinity of San Francisco and Portland, scenes like the one shown in the accompanying illustration are very familiar. Acres of ground are covered with the plums, arranged in partitions one layer



Drying Prunes in Oregon

thick for proper exposure to the sun. After being dried the prunes are shipped to all parts of the United States and sold to the thousands of consumers. Nearly all the prunes we eat come from the Pacific coast.

ANOTHER POLAR EXPEDITION.

An interesting attempt is to be made to locate the magnetic pole by means of a small boat, and a crew of eight men, under the command of Capt. Arundsen. The boat is being fitted out for the expedition at Christiania, and she will depend upon propulsion from both sail and a small naphtha motor, of sufficient power to supply a speed of five knots per hour. She will carry a reserve supply of fuel sufficient for one hundred days' steady use, though of course she will be mainly dependent upon her canvas. It is intended, if possible to remain in the ice four years. Owing to the diminutive size of the vessel, she will not be able to carry a large supply of provisions, but it has been arranged to obtain further supplies from time to time from the Dundee whalers. A station will be set up and furnished with self-recording instruments, which will collect scientific data. The members of the expedition will make journeys for geographical and other investigations.

The potato crop in Manitoba last year amounted to 3,459,325 bushels.

DRIED SWEET POTATOES—A NEW FOOD PRODUCT.

Agricultural Department Makes a Discovery That May Add Materially to Our Food Supply

The Agricultural Department has discovered a method for preserving sweet potatoes, and it will soon be no uncommon thing to go to the grocer's for ten cents' worth of dried sweet potatoes. The experiments were made at the government station in South Carolina and Bulletin No. 169 reports: The station undertook to find a method by which the potatoes might be dried, with an improvement of the keeping quality and no loss of edible quality. After numerous experiments it believes that these results may be obtained by boiling the potatoes in an open kettle and drying in a fruit evaporator. The method followed at the station was as follows:

By means of a derrick used in the cannery several bushels of green potatoes were lowered in an iron basket into a large boiler in which the water was heated by steam. To secure uniform cooking the roots should be nearly of the same size. Those weighing from 1 to 2 pounds required one hour for thorough cooking. Six to eight hours were required for evaporating them at a temperature of 150 deg. F. An ordinary laborer peeled and sliced 1 bushel per hour.

The evaporated product, it is claimed, "will keep for an indefinite time and bear transportation to any part of the world at any season." To prevent hardening of the product it should be packed in close boxes as soon as practicable after removal from the hot room.

To prepare the product for table use "soak the slices in warm water for an hour and prepare as dressed or candied potatoes. The desiccated potatoes may also be used as are the fresh roots for puddings or custards." For the latter purpose they may be quickly prepared by adding a small amount of warm water and boiling; not more than fifteen minutes will usually be required.

An engineering congress will be held at St. Louis during the exposition.

EASY ELECTRICAL EXPERIMENTS

By L. P. Dickinson

A PORTABLE VOLTMETER—PART II.

In the previous chapter a description was given of the moving parts of our voltmeter. It consists of a straight steel needle at the center of which is mounted a small thin bit of soft iron about ½ inch long, and ⅛ inch wide, and of a pointer attached at the top of the needle, made of a strand from a broom. The piece of iron and the pointer are secured by a small strip of brass as previously described, and the whole moving system suitably mounted in glass bearings so as to turn very freely. The strip of iron should be at such a height above the base board that it is half way between the latter and the horizontal steel magnet. The magnet will then turn the iron strip around until it points along a line parallel to the pole pieces. The pointer should now be turned toward the left by bending the strip of brass until, with the iron strip in the position just described the pointer is bent away at an angle of about 30 deg. Referring to Fig. 4 the strip of iron can be seen at I, and the ends of the magnet pole at M with the needle passing vertically between them. In Fig. 3 the position of the pointer relative to the rest of the instrument is shown at P. Having completed these adjustments the pointer and moving armature should be counter-balanced by filing, or bending the brass strip until tipping the instrument produces little change in the position of the needle. Care should be taken to see that the needle moves very freely and that the pointer P always returns to the same position after being deflected.

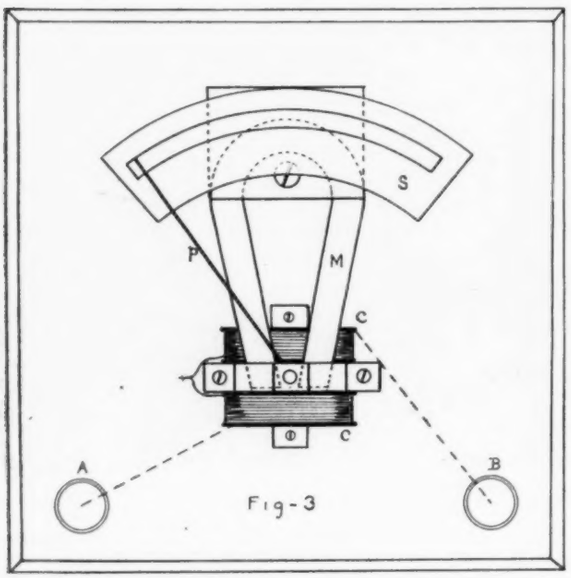


Fig-3

In Fig. 3, there can be seen at C two coils of wire. These are made by winding the coils upon two brass frame works each of which consists of a rectangular spool with heads of the shape shown at C in Fig. 4. These heads are 1½ inches long, ⅞ inch high and are made of thin brass. The shank of the spool is likewise made of thin brass and has an opening through its center ⅝ inch long and 3-16 inch wide. The purpose of this opening is to allow the coils to be supported close to the moving armature and yet to allow a free space in which the strip of iron I may turn. The ends of the spools are soldered to the shank and together make up a spool which is ⅜-inch wide. On one side of each spool a lug is left projecting by means of which the spool may be screwed to the baseboard.

Carefully insulate the whole interior surface of the spool and wind the same full of No. 36 double silk covered magnet wire. The spools are then mounted in the position shown in Fig. 3. They are connected together in such a way that the effect of one is added to that of the other and their free ends are connected to two binding posts A and B. The purpose of these coils is to receive the current to be measured. The effect of the current in the coils is to cause the pointer to move in one direction or the other against the pull of the magnets. The greater the current strength in the coils, the more will the needle be deflected. The current strength in the coils is dependent upon the voltage between A and B and by proper calibration, therefore, the instrument may serve as a voltmeter. In order to measure the deflection of the pointer a circular scale cut from a piece of stiff Bristol board is mounted at S, by being glued firmly to the top of the magnet, the pointer being so adjusted that it is about 1-16 inch above the scale. In our next chapter an explanation of the method of calibration will be given.

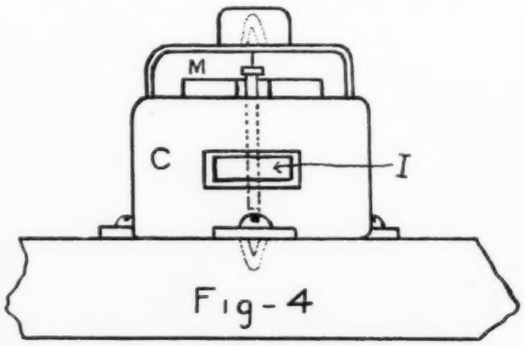


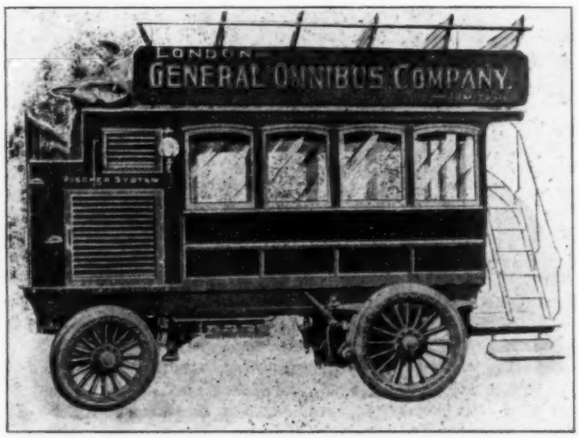
Fig-4

NEW THING IN LAWN SHEARS.

A convenient contrivance is a pair of lawn shears which are so constructed as to allow the operator to stand erect instead of stooping as formerly. The shears are described thus: The blades are pivoted on a shoe, which holds them a suitable distance above the ground, and on a vertical extension of this shoe the levers are pivoted, with their lower ends projecting in slots in the blades. A cross piece on the shoe extension is provided with members for limiting movements of the levers. The device will be found particularly useful for trimming around bushes or along a fence.

GASOLINE OMNIBUS FOR LONDON.

The first gasoline motor bus to go into service in London has had its initial test. It was made in the United States. In style it is not unlike the tram cars in use there, having "garden seats" on top reached by a stairway from the platform.



London's First Gasoline Automobile

The Motor Age says it has a speed of 12 miles an hour; its motors are 16 horse power and it will seat 30 passengers. The motor is inclosed in a compartment under the driver's seat.

How Granite Is Polished

The accompanying illustration shows a granite polishing machine in operation. When a block of granite is received by the manufacturer and has been trimmed off by hammer and chisel to the proper size the surface of the block is gone over with a sharp pointed tool called a point, which is driven by a hammer. By the use of the point all the irregularities are removed and, says the Monumental News, when the block is ready for the polishing bed the variations of the surface seldom exceed one-half inch. The pointed sides of the blocks may be seen in the illustration. After the point-

Granite Polishing Machine in Operation

ing the granite is placed on wooden blocks under the polishing wheel, built up to the required height to enable the workman to control the action of the machine. The size of the bed is usually regulated by the capacity of the machine. Those having a longer reach than others can cover a greater surface and economize in time. In the illustration two good-sized dies are being polished. A frame work of light boards is built around the stones and all of the interstices filled with plaster, which sets quickly and prevents the abrading or cutting material from being wasted.

Chilled iron, steel shot, crushed steel, or carborundum are the abrasives used for grinding. These are applied through the opening in the revolving iron disk and kept moist with water supplied through a hose while the disk is moved around the surface of the stone by the operator. The latter has a small wooden paddle with which he feeds the material into the wheel. The grinding continues until a uniform surface has been secured; the stone is then washed and a finer grade of carborundum or emery is used in the small manner as in the first process. This gives the smooth surface a dull polish and prepares it for the final glossing. A thorough washing is then given, and a substance known as putty powder (oxide of tin) is applied, and the surface rubbed with a felt wheel until a high gloss is produced. Before the putty powder is applied the surface must be free from scratches or blemishes, or it will not be possible to get a good polish. Oxalic acid is sometimes used on cheap work in connection with the putty or in place of it, but the results are not so satisfactory, the polish is not so lasting and there is danger of the acid damaging the stone unless the utmost care is taken to prevent it by thorough washing.

Mouldings or uneven surfaces are polished either by hand, using a piece of railroad iron, or with a pendulum machine to which is attached an iron plate, the same abrasives, etc., being used as on the flat surfaces.

Britain's Reign Has Ended

Andrew Carnegie Tells The English of the New Power That Rules The World

Andrew Carnegie spoke the following to a London newspaper writer:

You led the world once, but now we have taken your place. You cannot compete with us in industry, and you will be happier if you acknowledge it. Our manufactures are already three times as valuable as yours, and our exports greater. How can you compete with us? The very size of our great industries gives us an immense advantage. By standardization we can supply the demands of the world at prices you cannot think of. You are exhausting your coal and iron very rapidly. Your rate of increase in population must soon begin to diminish. You are already full up. We are only beginning. We have plenty of territory entirely unexplored, where there will some day be a great population. Your colonies are not increasing. Australia seems full. It is a mere rind around an empty interior. South Africa is not a white man's country, and your Government's policy of encouraging emigration there, especially of women, is almost a crime. As for Canada, compare her growth in the nineteenth century with that of the United States. Her only chance of a future is to throw in her lot with the Americans.

VALUABLE TO PHOTOGRAPHERS.

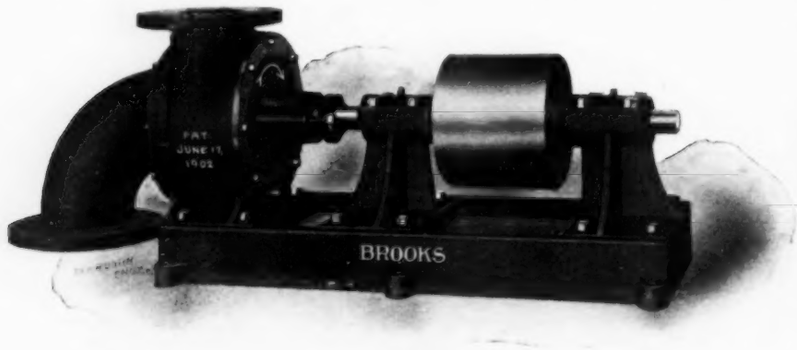
Those of our readers who are interested in amateur photography can secure a very interesting and valuable booklet free (by mentioning Popular Mechanics). Sixty unusual color effects are shown, together with hints on mounting. Send to the Niagara Paper Mills, Lockport, N. Y.

A big whip company in the East is advertising for 100,000 eel skins, which must be 24 inches long and 2½ inches wide through the body. The skins will be used for covering whip handles.

SHOP NOTES

REMARKABLE CENTRIFUGAL PUMP.

The illustration shows a new type of centrifugal pump which does the same work but uses only one-half the steam required by others. It is a 4-inch pump and weighs only 280 pounds. By the application of a new principle vibration is prevented, thus avoiding expensive



New Steam Saving Centrifugal Pump

foundations. The pump consists essentially of a shell containing a revolving circular piston; this piston does not come in contact with the shell at any place, thus avoiding frictional contact and wear. Water is drawn in through an opening in the center of this shell and is by the piston given a centrifugal motion which drives it out through the discharge pipe. The discharge is steady and continuous. The piston has a rotary motion is perfectly balanced, and with no reciprocating parts. It has no valves and is not affected by sand, mud or grit, and will pass large bodies without injury.

The highest efficiency is attained when the discharge is from 8 to 11 feet per second. Water can be raised 75 to 90 feet, according to size of the pump. Tests of the pump illustrated gave a discharge of 500 gallons per minute, running at 1,500 revolutions per minute, lifting water 12 feet, discharging it at an elevation of 5 feet and using only 6 horse power. It promises to work a revolution in moving water. It is made in Chicago by the McMullin Motive Power and Construction Company.

COPPER REFINING.

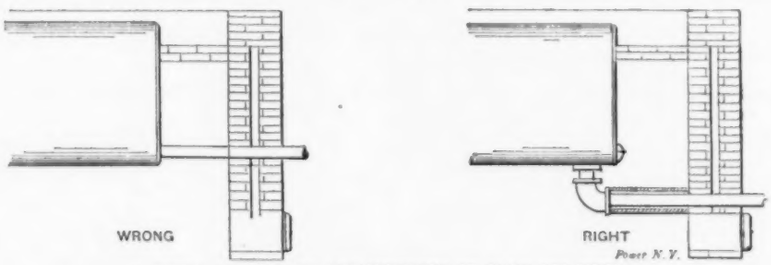
There is a prospect, says the "Engineering and Mining Journal," that practically the whole of the American copper output will ultimately be refined electrically. By this process the gold and silver, which even in Lake copper are never completely absent, are recovered. Very high current densities are used in the electrolysis—as much as 5 amperes per square decimetre. The present tendency is to increase the weight of the electrodes, since the weight lost in melting is much the same whether these weigh 2 cwt. or 4 cwt. The impurities originally in the copper are ultimately found concentrated in the slimes which accumulate at the bottom of the bath.

INSULATING COMPOSITION.

A French process relates to the manufacture of insulating composition with a basis of resinous substances or drying oils. Powdered resin, such as bitumen, gum-lac, pitch, or similar substances, which will not readily decompose at 250-300 degrees C., or drying oils are mixed with 25 to 35 per cent of powdered sulphur, and to this mixture is added, either cold or hot, from 30 to 70 per cent of inert fibrous or pulverulent materials, such as asbestos, sand, or pumice-stone. The whole mixture is then heated in a vessel with a loaded cover, while still mixing, to from 350 to 400 deg. C., until it becomes almost solid. The product is then compressed in moulds heated to from 250 to 400 deg. C. The resins or oils employed may, prior to use, be heated to from 300-350 deg. C. in order to drive off a portion of their volatile constituents.

LOCATION OF BLOW-OFF PIPES

A writer in Power says: The hole for the blow-off in the bottom of the shell should be reinforced on the outside and the blow-off pipe threaded up, but not extended entirely through the shell, thus not interfering with the complete draining of the boilers. That portion of the blow-off pipe which is exposed to the flame is, as you see, protected by a sleeve and packed with asbestos. A blow-off pipe which is threaded into the rear boiler head and extends horizontally through the setting should never be allowed, as it is impossible to thoroughly drain and cleanse the boiler because the bottom of the pipe is above the boiler shell.



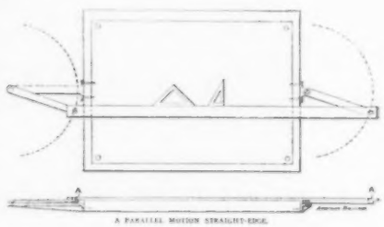
A RIGHT AND WRONG ARRANGEMENT OF BLOW-OFF PIPES.

COMPRESSSING AND EXHAUSTING PUMPS.

Pumps for corrosive gases, in which liquid seals replace metallic valves, have the disadvantage of requiring a high column of liquid to counterbalance the difference of pressure between the suction pipe and pump and delivery pipe respectively. This is obviated in a German invention by introducing a resistance to the flow of liquid in these parts. In one modification this arrangement takes the form of small pipes with a number of sharp bends between the suction pipe, the pump barrel, and the delivery pipe. In a second modification the pipes branch into smaller ones of the same aggregate area, while in a third the pressure which would be caused on the downstroke of the piston forcing liquid through the trap into the suction pipe is relieved by the downward movement of the liquid in the pump barrel inducing a current through another passage.

A PARALLEL MOTION STRAIGHT-EDGE FOR THE DRAWING BOARD.

A sketch of an arrangement for a parallel moving straight-edge is given in the American Machinist, which consists of an ordinary drawing board with brackets on each end. The blade is connected



A PARALLEL MOTION STRAIGHT-EDGE.

with these brackets with links, which cause the ends of the blade to follow in the path indicated by the dotted lines and to remain parallel.

FRICTION IN BALL BEARINGS.

It is a popular belief that ball bearings are almost free from friction. Experiments with special apparatus, by Prof. M. J. Golden, at Purdue University, indicate, on the contrary, that at high speeds ball bearings fail entirely. For ordinary pressures and speeds, according to the result of these experiments, ball bearings give a loss by friction less than that of ordinary bearings poorly lubricated, but not much less than that of a finely polished and thoroughly lubricated bearing.

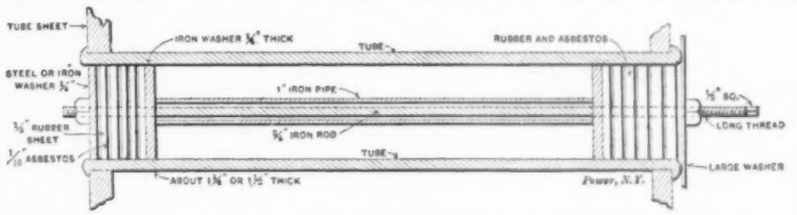
BOILER HORSE-POWER.

We are constantly coming into contact with the term boiler horse-power. Originally the horse-power was a horse-power plus about 50 per cent to prevent all possible cavilling as to what a steam engine would do. Steam pressures were very low; an engine would run at full power with a hole in the boiler. Thus the safety valve could be removed, and the engine would run says the Electrical Review, London. One of our friends has run an engine for half an hour after the fusible plug had melted out and the fires had been drawn. The damper was shut, and the hot brickwork helped to generate steam, until so much air was in time drawn in at the plug-hole that the vacuum was too much impoverished to run the loaded engine. In this case the engine was an old-fashioned beam engine of 30 nominal horse-power, and being much underloaded, a breath of steam sufficed to produce a vacuum. The nominal horse-power was simply Watts figure of 33,000 foot-pounds per minute, as determined by him, being 50 per cent in excess of the rate of work of a London drayhorse. Very quickly the nominal power of an engine became less than the indicated power, for steam pressures rose, and engine speeds increased. The nominal horse-power was supposed to be rated on so many square inches of piston area, and a speed of 220 ft. per minute. As engineers, we all seem to be too anxious to find new units. With a hundred years of experience behind us we try to give new values to the horse-power as a unit. We are all right as regards an engine, for we can rate it at so many brake horse-power with a certain pressure. But when we try to fix the size of a boiler in horse-power, we are measuring land areas with a pint pot. There is no suitability of measure. A boiler horse-power is now often measured as its capacity to evaporate, so many times about 30 lbs. of water. Would it not be better to adhere to the unit of evaporation of 1 lb. of water from and at 212 deg. F. This is a definite unit which is fully recognized. The so-called boiler horse-power is merely so many to the pound units evaporation. The boiler horse-power must be converted into actual horsepower for every class of engine, and merely introduces a confusion. It is simply a new kind of nominal horse-power. The disappearance of this as regards engines has often been hailed with joy. Why resuscitate the confusion? It is easy enough to say a 12,000-unit boiler and takes as few figures or letters as to say a 400 h. p. boiler, while, at the same time, it expresses a definite capacity to evaporate a given weight of water per hour from and at 212 deg. F. Why should any weight of steam produced represent a horse-power? Some engines use less than 10 lbs. of steam, others probably use 100 lbs. per horse-power-hour. There is no uniformity of steam consumption by an engine that enables us to employ the conventional boiler horse-power to any better advantage than the old nominal horse-power.

To further aid in the extermination of mosquitos in New Jersey, for which purpose large quantities of petroleum are now being used, the swamps, which breed millions of the pests, will be drained.

TO STOP LEAKY BOILERS.

The drawing shows a tube stopper in general use on steamers, the use of which is described by Power. When a boiler tube leaks one of these stoppers is shoved into the tube and held there by holding a hoe or other suitable tool against it while one of the engineers screws up on the nut. This expands the rubber and holds itself in there. When the vessel reaches port and the boiler-makers cut out the tubes, the stoppers may be recovered and made up again

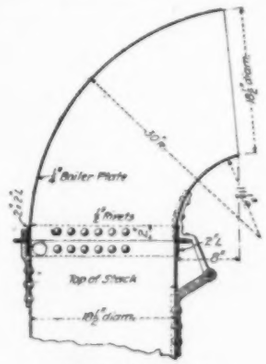


BOILER TUBE STOPPER.

by putting new rubber and asbestos on each end. It is not necessary to slow down the engines to put in the stoppers. Tubes that are open when the ship leaves port rarely get stopped up with soot, but tubes fill quickly with salt from leaks that cannot be seen even with pressure on.

HOODS FOR SMOKE-STACKS.

Conditions in the Cascade tunnel, two and one-half miles long, on the Great Northern, have made it necessary for the pusher engines to use hoods over their smoke-stacks. The absence of means of ventilating the tunnel, which is deep under the mountain, causes a dangerous collection of heat and gas, and to help matters as much as possible the hoods were devised. The hood, says the Railroad Gazette, is connected to the stack by a hinged joint at the back and there is a pin with a cotter riveted to the stack at the front. This passes through a hole in the flange of the hood, so that when in position, as in the illustration, it is held firmly in place. The hood is thrown in position when the engine enters the



Smoke-Stack Hood

tunnel and is thrown back when leaving it. The effect of the hood is that the smoke from the engine is driven backward instead of roofward, thus preventing the envelopment of the train.

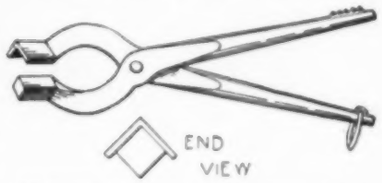
The C. M. Schwab Free Industrial School at Homestead, Pa., has been opened. It will teach boys all lines of trade and will instruct girls in cooking and house work.

MAGNETIC SEPARATORS.

This invention, of Swedish origin, comprises a frame of zinc or other non-magnetic material, arranged to reciprocate between the poles of an electro-magnet, and carrying two series of tapering pole-pieces. A series of apertures is provided in the frame, and the material, such as iron ore, to be treated, is fed through these apertures, as the frame reciprocates, from a hopper supported by the magnet. The non-magnetic parts of the material fall immediately upon inclined shelves, and the magnetic material is carried away from the central line of the magnet, and finally upon some of the other shelves, according to the intensity of magnetism of the material. In a modification, a horizontally rotating ring is used instead of the frame, and in a second modification there are two magnets used in conjunction with two frames.

HOME-MADE TONGS FOR HOLDING SLIP-SHARES.

While sharpening a plow slip-share, the ordinary straight tongs will slip and



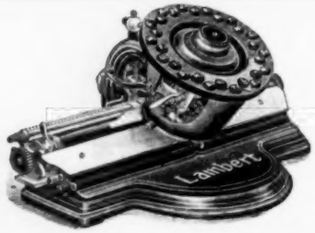
AN INGENIOUS FORM OF SLIP-SHARE TONGS.

jar loose from the hammering. Some smiths use a kind of handle and brace to bolt on with two ⅜ by 1 inch plow bolts, but it takes too much time this way. The bolts will heat and work loose, so that it takes a wrench to keep them tight, especially when an old slip-share is worn at the top of the landside. Sometimes it comes unwelded.

A writer in the American Blacksmith says my slip-share tongs will hold a bar of lay-steel together so that it cannot jar loose. They will fit any kind, right or left, any size or any make of share and hold it firmly. They are never in the way over the anvil while sharpening or pointing a slip-share, and have the same angle as if a solid bar were bolted on. They never will work loose.

I have seen seven other different devices, made for this purpose, fail, but mine never does. During my apprenticeship of ten years, I studied on a new device for this purpose and I caught the idea of the tongs illustrated. In the sketch the first figure shows the tongs in elevation, the second, an enlarged cross-section at the end of the lips.

The new Cunard steamers now building in England will each have 65,000 horse power.



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In order to report an automobile race recently, the editor of the Motor News, published in Dublin, Ireland, chartered a balloon, and sent his reporter up where the entire race could be viewed from start to finish.

Dixie W. Thompson, the owner of the 2,500 acre bean farm, the largest in the world, at Santa Barbara, Calif., is dead.

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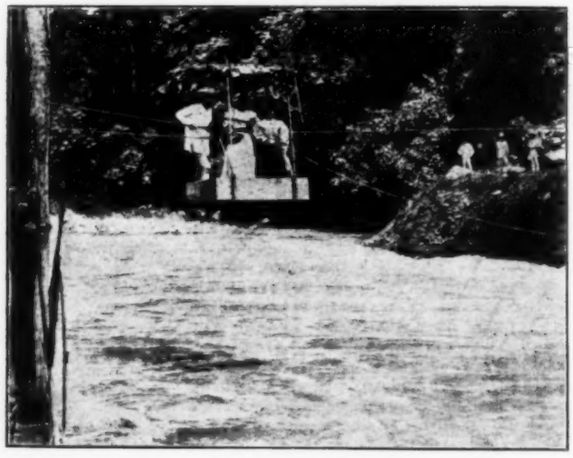
NEW HULL DESIGN.

A new and interesting departure in the shape of ships' hulls has been designed by Constructor Kretschmer, of the German Naval Department. He has been led to make this innovation in the desire to increase the efficiency of a vessel, without at the same time an abnormal augmentation of the coal consumption. Prof. Kretschmer, instead of designing the hull somewhat after the form of a fish, has taken as his model an aquatic bird, which, like the ship, makes its way along the surface of the water. In his design the ship's hull has the shape of tetrahedron or double wedge. By this means it is anticipated that the efficiency of vessels will be increased by 50 per cent. Another great advantage is that such vessels will have no wash.

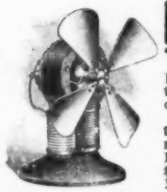
STRANGE AERIAL FERRY IN MEXICO.

A strange method is employed to cross the Rio Blanco river in Mexico. A wire rope is stretched across the stream and a sort of box capable of holding three persons hangs from the rope and is drawn across by persons on the bank. Trolley wheels run upon the cable. The passengers must stand perfectly still as the least motion on their part would cause the car to sway and throw them out. Modern Mexico says the river is fed by melting snows on the mountains and the hotter the summer the larger the amount of water in the river.



Bridge Over the Rio Blanco, Below Orizoba.

A Chattanooga concern makes wooden bowls for bakers' use, as large as 4 feet diameter. The machinery for turning these great bowls is unique. It cuts them out of the solid block in "nests," wasting very little wood, cutting away only 5-16-inch between one bowl and another.



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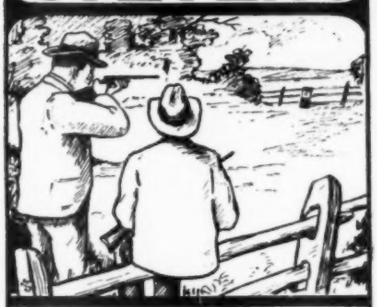
Agents Wanted.

ACME ELECTRIC CO.

200 So. Clinton St. Chicago, Ill.

Reference: Continental National Bank.

STEVENS



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Boiling Water Without Fire

clamp around it so that the two sides of the clamp cause a constant friction upon the tube, the latter grows hot and reacts naturally upon the water contained therein until it begins to boil and finally throws out the cork. In this way boiling water is obtained which may be used for any purpose.

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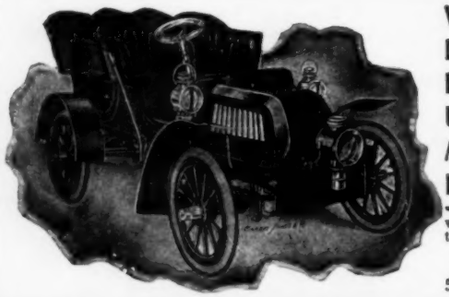

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WHEN THE TELEGRAPH OPERATOR GOES TO SLEEP THE CLOCK CLOSES THE CIRCUIT.

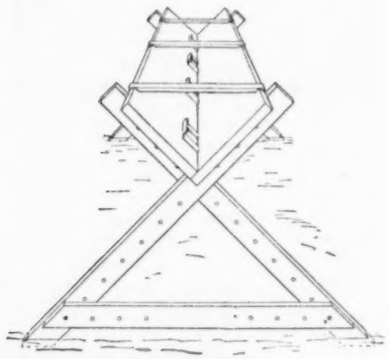
S. R. Wright, of Morton, N. Y., has patented an electrical device to connect telegraph instruments with a clock, whereby any telegraph key left open for two minutes will be automatically closed by the clock, at the same time striking a gong calling attention to the broken circuit. Leaving open the key is a frequent occurrence on railroads, and sometimes leads to serious wrecks. By the use of this new and clever device all operators on a line equipped with these instruments or clocks can be called by the gong, as it makes an alarm which can be heard much farther than a telegraph instrument.

NEW FIRE EXTINGUISHER.

An engineer named Max Eberhardt, gave at Munich a few days ago a demonstration of the effectiveness of a new preparation for extinguishing fires. The preparation is a liquid of a milky color. The first experiment showed that the skin when painted with the liquid becomes insensible to heat. Rags saturated with petroleum can be burned upon the hand after it has been immersed in the liquid. Small fires can be extinguished with the hands, and with one pailful of the liquid a fire in a pit of tar was put out in one second.

HOW TO MAKE A TEMPORARY IRRIGATING SYSTEM.

During dry times the product of a garden may be doubled by using a simple system of surface irrigation. The Department of Agriculture recommends the following plan. The troughs can be moved about where most needed. The troughs were made of inch boards set at right angles to each other. Cleats were nailed across the top, one at the center and one near the ends of each trough, to keep the boards from spreading. Two sizes of troughs were used, the larger being made of one 12-inch and one 10-inch board and the smaller of one 10-inch and one 8-inch board. The smaller troughs were used farthest away from the source of the water. The end of one trough set inside that of the next, and leakage at the unions was prevented by placing between the over-lapping boards a strip of building paper or a little dirt. The troughs were supported in the field by straight crossed stakes. Each of the stakes had a row of small auger holes through its center,



Irrigation Trough

about 3 inches apart, so that by slipping an iron spike through the pair of stakes at the proper point the troughs were adjusted at the desired height. A tie strip was pinned across from one stake to the other, just at the surface of the ground, to prevent the bottoms from spreading or from settling too far in the ground, as they are sometimes inclined to do after the soil becomes wet.

Water was permitted to flow from the troughs through three-fourth inch auger holes spaced 3½ feet apart on one side, near the bottom of the trough. The flow of the water was controlled by a sliding gate made of two small pieces of thin galvanized iron. One has a three-fourths inch hole through it, half an inch from its lower edge, and the side edges are bent over, so that the other, which has its upper edge bent forward at a right angle to form a handle, may be slipped in and thus form a gate to shut off the hole more or less at will. This device is tacked with clout nails to the inside of the trough, so that the hole exactly coincides with the one through the board that forms the side of the trough. If the attendant discovers that one row is receiving more than its share of water he partially closes the gate at the end of this row, and if another row is receiving too little he opens its gate more. A sufficient length of trough should be used so that the holes can discharge all of the water delivered without being open to their full capacity.

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There's quite a lot of ignorance that silence would disguise,
How very little people know you never would surmise,
If they didn't talk so much they'd be considered wise.

There's little one can talk about from which no harm can come.
There's much of hidden danger lies in confidante, or chum,
And secrets told are far less safe than if the lips were dumb.

How often one, in argument, by fiery impulse led,
Will many more antagonize, and bitter discord spread!
I guess the most we talk about were better left unsaid.

And so I think a man may fill a high and honored place,
And carry many grievous sins with dignity and grace,
If he can wear a pleasant smile and a calm and silent face.

There's many men in prison cells and liable to stay
Who might be floating at the top, distinguished, blithe and gay,
They answered people's questions, and gave themselves away.

We all know men well qualified a prison cell to fill,
Who never got behind the bars, and maybe never will;
And all the reason for it is—the gentlemen kept still.

—Cincinnati Enquirer.

FATHER OF WATERS.

Mississippi River Makes Gulf of Mexico Play Second.

While the great Father of Waters is at a flood tide, the big river is more powerful than the sea, and is making the great Gulf of Mexico take a back seat. Very few people will believe it save those who are familiar with such things, but according to the records of the river engineers, the gulf waters are dominated by those of the Mississippi River right now. The question has often been asked by persons of an inquiring turn of mind, How far out into the gulf does the water of the Mississippi go? According to the records, one can at flood tide in the river drink fresh water from the sea 10 miles beyond the mouth. This seems strange, perhaps, but it is a fact. When the men were at work on the great Eads jetties it was common to see a man dip up a hatful of water from the sea and drink it with relish. The force of the current and the volume of it carry the fresh water far into the gulf, and the river water being so much lighter than that of the gulf, it remains on the surface for a long time. The discoloration is noticeable for miles out to sea, and the demarcation is as plain as that of the Gulf Stream.

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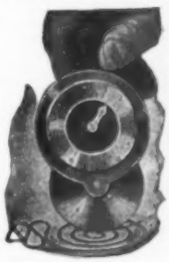

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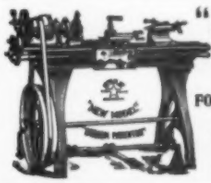

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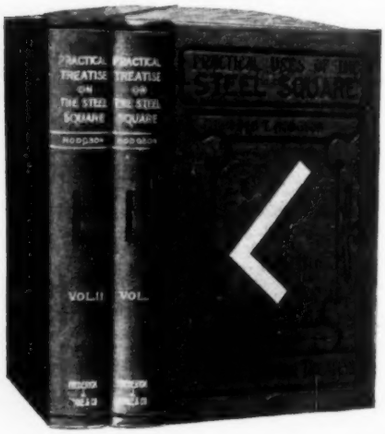

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